Developing Synoptic Human Stressor Indices for Assessing the Ecological Integrity of Freshwater Ecosystems

3rd Regional Oversight Committee Meeting
St. Joseph, Missouri
January 24, 2007

Meeting Minutes

Gust Annis (MoRAP) called the meeting to order at 10:00 am and covered the meeting logistics. Attendees went around the room and introduced themselves.

Gust then gave a presentation covering some background information and project progress. This presentation will be available on the project page of the MoRAP website.

General Comments and Discussion:
Gust brought up the point that he and Scott Sowa have been discussing the fact that it may be better to use the phrase Human Threat Index (HTI) as opposed to Human Stressor Index (HSI). Partly because HSI is used for other purposes, but also because the things we are considering for this project are really Threats and not necessarily Stressors to freshwater ecosystems.

Gust brought up the point that metadata has been a challenge, and is lacking, for many of the data sets that have been acquired. Holly Mehl from the Environmental Protection Agency indicated that EPA is really trying to address the issue of updating geospatial data and associated metadata.

Randy Sarver from the Missouri Department of Natural Resources (MoDNR) brought up the point that there is a soil loss potential that could be calculated (STEP-L), developed for the 319 program. This is a very simple program and easy to run.

Walt Foster from the Environmental Protection Agency (EPA) inquired as to whether the toxic releases that were run thus far were from TRI. Gust indicated that they were. Walt indicated that TRI lacks most of the smaller releases and most of the chemicals that are released. Gust acknowledged this and stated we are using other data sources to account for these (NPDES, RCRIS). Walt will work with Gust to help get the best data sets together.

Presentation by Kathy Doisy (University of Missouri):
Kathy Doisy from the University of Missouri (MU) gave a progress report and presentation on the Literature Review she has been working on. Kathy's presentation will be available on the project page of the MoRAP website.

Key points from Kathy's presentation:

- Weighting is difficult because of interactions among ecological processes and in conjunction with the fact that stressors affect multiple ecological factors.

- Use information developed by others: Threats and stressors are often used simultaneously.
- Will provide a stressor specific index as an appendix to the final literature review.
- Results so far: Water Management and Agriculture have been completed.
- What have we found?
    - Detailed information on the effects of various land use activities on the five components of biological integrity
    - Weighting of the stressors has been done by other groups. The resultant weightings may not work for this region, but we may incorporate their methods into our work
    - Threshold data is available for urban impacts and some agricultural practices but not much information on other stressors
    - Past land use may have an impact (but GIS data is not readily available)
    - There is no consensus on the most appropriate spatial scale (watershed, local) for detecting stressor effects
    - Knowledge of the land use within the riparian buffer is critical in determining the level of impact of various agricultural activities esp. animal production because land use in the buffer has a disproportionate effect on the stream

Walt Foster (EPA) has recently downloaded historic agricultural land use by county for entire U.S. This may be a way of getting at historic land use.

Stressors for which Kathy needs citations: salt scars, hazardous waste haulers and handlers, toxic releases, sludge, golf courses, NPDES, power lines, airports, rail yards, military sites.

Holly Mehl (EPA) said she is working on GIS data for sludge.

Walt Foster (EPA) indicated that there is a lot of literature on toxic releases, but only for specific chemical constituents. Scott Sowa (MoRAP) asked if there is there any way to group them into broader constituent categories. Walt will look into this.

Eliodora Chamberlain (EPA) indicated that they do have risk assessment reports for military sites. Randy Sarver (MoDNR) said that there are lots of NPDES reports that cover this topic, but too many to go through. Matt Combes from the Missouri Department of Conservation (MDC) indicated that there has been some work done in Kansas by graduate students. Kathy Doisy was aware of these. Walt Foster said there is someone coming from the FAA to talk to EPA about the affect of airports on natural resources.

Scott thanked Kathy for doing such a thorough job. Clay Pierce (Iowa Cooperative Fish & Wildlife Research Unit) stated that these reviews should be made available as interim products on the website and should also be either prominent in the report or published separately since they are so valuable.

Presentation by Clay Pierce (Iowa Cooperative Fish & Wildlife Research Unit):
Case Study, Relations between fish indices and coarse-scale HSI in Iowa

Questions/Discussion:
Eliodora Chamberlain (EPA): Suggested that based on what Clay showed we may not need to quantify these data at such a fine level of detail. Scott and Gust discussed the need for this higher level of detail. Randy Sarver (DNR) thought that this higher resolution stuff would be extremely valuable for finding candidate reference sites for headwater streams.

Discussion on monitoring data for evaluating HSI and future applications:
Gust mentioned that he had been to the Central Plains Center for Bioassessment to get the REMAP data, but was unable to get the data. Matt Combes (MDC) suggested contacting Debbie Baker at the center and Walt Foster indicated that if Gust told him what he needed he could get it from Don Huggins. Matt Combes mentioned that the Region 7 REMAP data won't have the most recent Missouri data, and that we'll have to get that from him.

Holly Mehl thought that there was also a lot of other data like, NAWQA, NWIS, and STORET that might have biomonitoring data that could be useful.

Matt Combes (MDC) indicated that STORET has the REMAP data, but also a lot of other biological data. Walt Foster (EPA) said he would get us the REMAP data for Region 7.

Discussion on ranking and weighting:
Data normalization discussion commenced.
Clay Pierce and Kathy Doisy suggested using the 95^{th} percentile or two Standard Deviations from the mean as the cutoff and dividing all of the values by this value instead of using the highest value since the highest value is likely to be an outlier. Scott Sowa asked about the fact that many of these threats have a high number of zeros which will make these measures relatively low. Kathy Doisy said she would ask Matt Knowlton about this issue.

Clay Pierce thought that in the manual for the Primer statistical software package he thinks there is a chapter on data normalization etc. that may be helpful. Kathy Doisy suggested asking Mark Elerseck at the University of Missouri.

Walt Foster (EPA) wondered how we were going to be able to interpret an average across multiple metrics when you might have fourteen 50s or seven 100s and seven 0s in a 14 metric index. Both would have the same average value but would be very different. Scott Sowa stated that this is a difficult issue to deal with since you have both the cumulative impacts and magnitude of impacts. He gave the example of what was done for Missouri.

The group agreed that the bottom line is that the raw data and metrics are critical and that the users of the HTI must be instructed on how to work backwards through the data (from HTI back to raw data).

Scott Sowa also brought up the issue of local vs. watershed HTI. The group agreed that it would be most useful to keep them separate and not try to integrate them. However, a map showing those segments that have high HTIs for both local and watershed would be useful.
Gust Annis asked if the group thought we should still develop HTIs separately for each of the elements of biological integrity. The group agreed that we should.

Weighting discussion commenced.
Gust Annis asked Kathy Doisy how the literature review might help us with weighting.
Kathy thought that it might be good to have the committee members read the literature reviews and redo the weighting survey. Gust Annis worried this may bring in too much of a bias. Randy Sarver mentioned that it is hard to do the survey from the perspective of ranking/weighting stressors across all of region 7. This is partly because of the different perspectives an individual may have depending on where they are from; for instance pasture in the Ozarks vs. pasture in Western Kansas. Walt Foster stressed that this is exactly why it is so difficult to develop an HTI that applies across all of EPA Region 7.

Clay Pierce mentioned that he would like to see an un-weighted index because there is too much uncertainty when weighting.

Randy Sarver thought that weighting should be used minimally because it can become a never-ending exercise.

Both Clay Pierce and Kathy Doisy thought they would be more comfortable in developing indices with a different number of metrics than weighting metrics.

Randy Sarver wondered if there was a way to build the indices separately by ecoregion. Scott Sowa did not think there would be enough time to do this.

Clay Pierce suggested that committee members would likely weight things differently depending on the organisms under consideration.

Randy Sarver wondered if we were going to account for intercorrelation. Scott Sowa thought that we would.

Matt Combes suggested we keep the index very simple, because the raw metric values are really the most important thing.

Discussion on integrating distance measures as weighting factors.
Scott and Gust explained that they were thinking we could multiply density by 1/avg dist and then 1/closest. Clay Pierce and Randy Sarver suggested that you don't even need to consider density. Walt Foster, Kathy Doisy and Scott Sowa disagreed. Kathy Doisy stated that we shouldn't double dip with the distance weighted metrics. Instead, we should do something along the lines of what Scott and Gust originally proposed.

The group agreed that we need Kathy Doisy to focus some of her efforts with the literature review in the near term on this issue and on the issue of data normalization

Discussion on data limitations and disparities among states:
Scott and Gust discussed the major disparities in data among the 4 states. They suggested we build a lowest common denominator HTI for Region 7 and the "Cadillac" version for Missouri, which has the most data. The group generally agreed with this plan. Randy Sarver pointed out that MDNR is providing 319 monies for Missouri and has also provided money for validation.

Vernon Tabor (USFWS) mentioned that it is difficult or impossible to get gravel/sand mining data for Kansas streams; most operations are unpermitted and illegal.

Metadata: Holly Mehl (EPA) is not doing metadata for the data sets that are most useful to us right now, but she will get to some of them by the end of the project.

Discussion & Future Directions:
Gust Annis indicted that work will continue on processing the data sets, especially the ones that will require more "set up" work. Once the raw data has been compiled work will begin in earnest on applying appropriate weighting schemes and HTI development. Kathy Doisy said she will focus on some of the main issues/questions that came up at the meeting today.
Kathy will send the semi-finished versions of the literature reviews to all members of the committee.

Gust and Scott thanked everybody for their help and participation. The meeting was called to a close at 3:00.